<u>Claims</u>

A data collector, comprising

a housing,

a vibration signal input on said housing,

an analog to digital converter within said housing connected to said vibration signal input, converting a vibration signal received at said vibration signal input to a digitized vibration signal,

an optical system within said housing, said optical system receiving light from outside said housing,

a receiver circuit converting said received light to a digital signal, and

a digital signal processing circuit connected to said analog to digital converter and said receiver circuit, and receiving, storing or processing said digitized vibration signal and/or said digital signal converted from said received light, for the purpose of predictive maintenance.

2. The data collector of claim 1 wherein said optical system further comprises a light source emitting light through an aperture in said housing for reflection and return to said optical system.

- 3. The data collector of claim 2 wherein said light source comprises a laser light source.
- 4. The data collector of claim 3 wherein said laser light source comprises a laser diode and a collimating lens, said collimating lens collimating diverging light from said laser diode to a collimated light beam emitted from said housing.
- 5. The data collector of claim 2 wherein said receiver circuit comprises a light detector for detecting reflected light, and said optical system further comprises a beam splitter positioned to direct reflected light received through said aperture to light detector, said beam splitter positioned between said light source and said aperture.
- 6. The data collector of claim 1 wherein said receiver circuit comprises a PIN diode for converting received light to an electrical signal.
- 7. The data collector of claim 6 wherein said receiver further comprises a threshold comparator for comparing current flow in said PIN diode to a threshold, and producing a digital signal to said digital signal processing circuit when said threshold is exceeded.

- 8. The data collector of claim 7 wherein said digital signal processing circuit computes a rate of rotation of a moving element in response to timing of said digital signal from said threshold comparator, whereby said optical system is usable as a laser tachometer.
- 9. The data collector of claim 6 wherein said optical system further comprises a filter positioned between said aperture and said PIN diode, said filter filtering light other than at a wavelength of said light source.
- 10. The data collector of claim 1 further comprising a storage device, said digital signal processing circuit storing said digitized vibration signal in said storage device.
- 11. The data collector of claim 2 further comprising a display and input keys, said digital signal processing circuit displaying operational information on said display and receiving operational instructions from an operator via said input keys.
- 12. The data collector of claim 1 wherein said housing is sized to fit in a single hand of an operator.



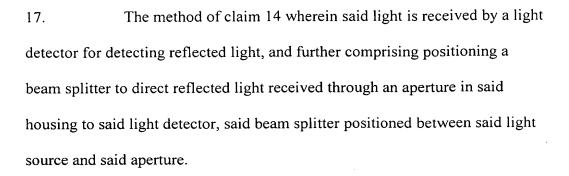
A method of collecting data for the purpose of predictive maintenance using a data collector, comprising

receiving a vibration signal into a housing of said data collector, and converting said a vibration signal to a digitized vibration signal withing said housing,

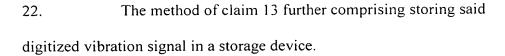
receiving light from outside said housing into said housing, and converting said received light to a digital signal, and

receiving, storing or processing said digitized vibration signal and/or said digital signal converted from said received light.

- 14. The method of claim 13 further comprising generating light within said housing and emitting said light through an aperture in said housing for reflection and return.
- 15. The method of claim 14 wherein said light comprises laser light.
- 16. The method of claim 15 wherein said laser is generated by a laser diode and a collimating lens, said collimating lens collimating diverging light from said laser diode to a collimated light beam emitted from said housing.



- 18. The method of claim 13 wherein said light is received by a PIN diode and converted thereby to an electrical signal.
- 19. The method of claim 18 further comprising comparing current flow in said PIN diode to a threshold, and producing a digital signal when said threshold is exceeded.
- 20. The method of claim 19 further comprising computing a rate of rotation of a moving element in response to timing of said digital signal resulting from said threshold comparison.
- 21. The method of claim 18 further comprising positioning a filter between said aperture and said PIN diode, said filter filtering light other than at a wavelength of said light source.



- 23. The method of claim 14 further comprising displaying operational information on a display on said housing, and receiving operational instructions from an operator via input keys on said housing.
- 24. The method of claim 13 wherein said housing is sized to fit in a single hand of an operator.